



## Smoking and Tooth Loss In Rhode Island Adults, 2004

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### Oral health is an integral component of overall health.

Loss of most or all natural teeth can lead to psychological, social and physical impairment; loss of teeth can limit speech, chewing ability and taste, and affect nutritional status.<sup>1</sup> Periodontal disease and decay are major causes of tooth loss.<sup>2</sup> Periodontal disease is manifested by the loss of connective tissue and bone that support the teeth, placing a person at risk of eventual tooth loss unless treatment occurs. Ongoing research aims to identify markers, including modifiable risk factors, of persons susceptible to periodontitis.<sup>3</sup>

Multiple studies accumulated from the international literature over 20 years provide convincing evidence that smoking is the main modifiable risk factor for poor periodontal health and tooth loss.<sup>2</sup> Estimates from these studies indicate that the risk of destructive periodontal disease is 5-20 times higher for a smoker compared with a never-smoker, and that periodontal treatment outcomes for smokers are poor compared with non-smokers.<sup>2</sup>

This study assesses the relationship between smoking and tooth loss in Rhode Island adults, and identifies other characteristics and modifiable risks associated with tooth loss.

### METHODS

Rhode Island's 2004 Behavioral Risk Factor Surveillance System (BRFSS) data were used for this analysis. The BRFSS is a state-based telephone survey of randomly selected non-institutionalized adults (ages 18 and older). The BRFSS monitors certain health conditions, access to health care, and behavioral risks that contribute to the leading causes of disease and death among adults in the United States. It is administered in all 50 states and 4 US territories with methodological specifications provided by the Centers for Disease Control and Prevention (CDC).<sup>4</sup> From January through December 2004, the Rhode Island BRFSS conducted 3,999 interviews.

We examined tooth loss in relation to nine variables associated with oral health, including tobacco use. To assess tooth loss, the BRFSS asks: "How many of your permanent teeth have been removed because of tooth decay or gum disease? Do not include teeth lost for other reasons, such as injury or orthodontics." Responses were grouped into four categories: no permanent teeth removed due to tooth decay or gum disease, one to five permanent teeth removed, six or more but not all teeth re-

moved, and all teeth removed.

Tobacco use was defined as current, former, or never smoker, a current smoker being someone who had smoked at least 100 cigarettes in his/her lifetime and is currently smoking every day or some days. Definitions for the other variables can be found at CDC's BRFSS website.<sup>4</sup>

We calculated prevalence estimates and chi square statistics to identify significant associations between tooth loss categories and each of the other variables. Using multinomial logistic regression, which simultaneously controls for all variables in the model, we calculated **adjusted odds ratios (AORs)** to assess the strength of relationship between extent of tooth loss, tobacco use and each of the other variables. P values <0.05 were considered statistically significant.

### RESULTS

Table 1 displays prevalence estimates for the extent of tooth loss for each variable, unadjusted for the influence of other demographic characteristics and risk factors. Overall, 56% of RI adults had not lost any teeth to decay or gum disease, 28% had lost 5 or

**Table 1.**  
Tooth loss\* for selected demographic characteristics and risk factors, ages 18 and older, Rhode Island, 2004

Demographic characteristics & risk factors		No permanent teeth lost	1 - 5 teeth lost	6+ but not all teeth lost	All teeth lost
All Respondents		56.3	28.4	10.8	4.6
Age Group	18-44 years	76.1	20.9	2.6	0.3
	45-64 years	42.3	38.1	16.2	3.5
	65+ years	23.1	33.8	24.7	18.4
Income	<\$25K	45.4	27.3	17.4	9.9
	\$25K- 49,999	51.1	31.1	13.3	4.6
	\$50K+	66.2	27.0	5.9	1.0
Education	No college	42.3	33.9	15.7	8.1
	Some college	59.5	26.1	10.9	3.5
	College graduate	69.6	23.7	5.2	1.4
Smoker	Never smoker	65.1	25.3	7.0	2.7
	Former smoker	45.0	32.4	15.0	7.6
	Current smoker	50.6	30.4	13.9	5.0
Physical Activity	Physical activity	60.7	27.6	8.6	3.1
	No physical activity	42.7	30.8	17.5	9.0
Diabetes	No diabetes	58.2	28.2	9.6	3.9
	Have diabetes	30.0	30.5	26.1	13.3
Obese	Not obese	58.5	26.7	10.2	4.5
	Obese	48.3	34.0	13.1	4.5
Disability	No disability	60.4	27.8	8.5	3.4
	Have disability	34.7	33.3	22.5	9.5
Dental Coverage	Have dental coverage	59.4	28.7	9.3	2.6
	No dental coverage	49.1	28.3	14.4	8.3
Number of Respondents (unweighted)		1,948	1,234	505	237

\*Data reported are weighted percents.

**Table 2.**  
Demographic characteristics and risk factors regressed on oral health indicators,\*  
ages 18 and older, Rhode Island, 2004. [Significant results only.]

Demographic characteristics & risk factors	1 - 5 teeth lost	6+ but not all teeth lost	All teeth lost
Ages 45-64 years	3.5***	12.6***	
Ages 65+ years	4.7***	23.3***	119.1***
Income <\$25K			3.9**
Education of HS or less	2.1***	3.5***	2.6**
Current smoker	1.7*	3.5***	4.7***
No leisure time activity		1.5*	1.9*
Have diabetes		2.3**	2.3*
Obese (>=30)	1.4*		
Have disability	1.3*	1.8**	
Level of statistical significance: ***p<0.001; **p<0.01; *p<0.05.			

\*Data are reported as adjusted odds ratios (AORs) by all other variables in the regression model.

fewer permanent teeth, 11% had lost 6 or more but not all their teeth, and 5% were edentulous. Compared to those who had never lost teeth to decay or disease, respondents who had lost one or more teeth were more likely to be 45 or older, to be smokers or former smokers, to not engage in leisure time physical activity, to have diabetes, to be obese, or to have a disability. They were also more likely to be in lower income categories, to have only a high school education or less, and to lack dental coverage.

The rates of any tooth loss for current smokers (49%) or former smokers (55%) were both significantly higher than the rate for non-smokers (35%). Likewise, the rates of losing six or more teeth and of being edentulous were both significantly higher for current smokers (14% and 5% respectively) and former smokers (15% and 8%) than for non-smokers (7% and 3%).

Table 2 displays AORs from the multinomial logistic regression, in which relationships have been adjusted for the influence of all other variables. It was not surprising that getting older (e.g. ages 45 and older) is the strongest predictor of tooth loss. The odds that someone over age 65 will have lost all their teeth is 119 times those for persons ages 18-44.

Other than older age, current smokers had the highest odds of tooth loss compared with never-smokers, after controlling for all other variables. The odds of losing 1 to 5 teeth are 1.7 times greater for smokers than for never-smokers, the odds of losing 6 or more teeth 3.5 times, and the odds of total tooth loss, 4.7 times those of never smokers.

Other characteristics and risk factors that independently increased the odds of tooth loss were having an annual income under \$25,000, lacking any college education, having diabetes, not participating in any leisure-time physical activity, being disabled, and being obese.

## DISCUSSION

Within the limitations of survey data in general and the BRFSS in particular, these findings demonstrate that current smokers have greater risk of moderate and severe tooth loss than never smokers, after controlling for possible confounders. These results have important public health program and

policy implications. Preventing smoking, or facilitating smoking cessation, can improve oral health and reduce the risk of tooth loss. Timely tobacco cessation can improve outcomes for costly periodontal treatments. Promoting linkages between oral health professionals and tobacco cessation programs could enhance interventions in both areas. Since dental providers are in an ideal position to advise tobacco users to quit smoking, the Rhode Island Department of Health's Oral Health and Tobacco Control Programs have collaborated to increase the number of oral health providers who identify tobacco-related oral conditions and tobacco use during oral examinations, advise patients to quit, and refer them to quitting services.

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## Disclosure of Financial Interests

The authors have no financial interests to disclose.

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